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Before the
Federal Communications Commission
Washington, D.C. 20554

JUN 23 35 PM '93

MM Docket No. 93-177

DISPATCHED BY

In the Matter of

An Inquiry into the Commission's
Policies and Rules regarding AM
Radio Service Directional Antenna
Performance Verification

RM-7594

NOTICE OF INQUIRY

Adopted: June 14, 1993;

Released: June 29, 1993

Comment Date: August 20, 1993

Reply Date: September 7, 1993

By the Commission:

INTRODUCTION

1. The Commission has before it a petition for rulemaking (petition) submitted by the technical consulting firms duTreil, Lundin & Rackley, Inc.; Hatfield & Dawson Consulting Engineers, Inc. (Hatfield and Dawson); Lahm, Suffa & Cavell, Inc.; Moffet, Larson & Johnson, Inc.; and Silliman & Silliman (petitioners). The firms are jointly requesting that the Commission initiate an inquiry into the policies and rules pertaining to the performance verification of directional antenna systems at AM Broadcast Radio Service stations.¹ Specifically, petitioners ask that the Commission: (1) review the pertinence of the present regulations concerning AM directional antenna performance verification, given the significant environmental, technological and economic changes which have occurred since the present policies and rules were adopted; (2) determine whether the present regulations are effective in controlling interstation interference, particularly at night; and (3) consider the adoption of alternative regulatory means made possible by advances in antenna analysis methods and instrumentation technology.

2. Petitioners argue that the physical environment in which AM stations now operate is significantly changed from that which existed when our current rules were

adopted. Many stations once located in rural areas have now been absorbed into expanding suburban and urban development, putting them in proximity to new buildings and other obstacles which can affect the magnitude and/or phase of the signals from AM antenna arrays. It is becoming increasingly difficult to find unobstructed field strength measurement locations in accordance with Section 73.186 of the rules. Petitioners also argue that improvements in technology, such as computer-aided numerical modeling of antenna performance, could lead to advances in antenna design and measurement techniques if the Commission's rules were amended. They also point out that adjustments of antenna arrays to establish the correct horizontal pattern in accordance with our rules may, inadvertently, cause the vertical pattern to depart from predicted values and cause unintended nighttime interference. The Commission's efforts when it restructured and improved the AM Service in Docket 87-267 could prove ineffective, petitioners argue, unless accurate measures are in place to assure that AM antennas are adjusted properly.²

3. Comments on the petition were filed by the following parties: duTreil, Lundin & Rackley, Inc.; Hatfield & Dawson; Lahm, Suffa & Cavell, Inc.; Moffet, Larson & Johnson, Inc.; CBS Inc.; Jules Cohen & Associates, P.C.; The National Association of Broadcasters (NAB); Capital Cities/ABC Inc.; and William G. Ball, P.E. Reply Comments were filed by Lahm, Suffa & Cavell, Inc. All commenters supported a Commission proceeding to examine the issues raised in the petition. Hatfield & Dawson, one of the petitioners originally requesting issuance of a Notice of Inquiry, stated in its comments that it now preferred a Notice of Proposed Rulemaking (NPRM), indicating that an Inquiry is unnecessary. A conference or forum of interested parties was suggested as a vehicle for developing specific rule changes for an NPRM. In their Reply Comments, Lahm, Suffa & Cavell, Inc., argued that the issuance now of an NPRM would probably not be wise and could lead to exactly the sort of delays Hatfield & Dawson were seeking to avoid. Lahm, Suffa & Cavell, Inc. argued that this is the time for a "more comprehensive proceeding that addresses all important philosophical, as well as mechanical, matters in the subject area."

BACKGROUND

4. As petitioners note, many of the current rules and policies governing AM directional antenna systems were adopted as part of the Commission's former *Standards of Good Engineering Practice* in 1939. Since that time, the rules have been amended many times, but the entire framework has never been comprehensively reexamined. A listing of the rule sections which are pertinent to this issue includes the following:

¹ An AM directional antenna array typically consists of 2 or more antenna towers, each of which receives power from the AM station transmitter. The power is fed to the antenna towers through "phasing networks", the purpose of which is to precisely determine the amount of power fed to each tower and the relative phase angles of the currents in each tower. This is done in order to control the direction(s) in which the antenna array radiates power. Directional arrays are used to provide strong signals in desired directions or to minimize interference to other stations, or both.

² The parameters of a directional antenna system, such as individual antenna currents or field strengths, may change over

time and actual measurements on an operating antenna system can differ from the authorized or permitted values of those parameters. Therefore, the Commission requires that AM station licensees 'prove' the performance of their systems by making tests and measurements specified in Part 73 of the rules. These tests, and any subsequent adjustments to the array they indicate as necessary, are intended to assure that the antenna system is in full conformance with the terms and conditions of the station's license and the provisions of the Commission's rules. As an AM array increases in size, the complexity of these tests increases commensurately, and the time and costs involved in a proof of performance analysis can be significant.

73.14	Definitions: Antenna current; Critical Directional Antenna; Nominal Power; and Proof of Performance
73.33	Antenna systems; showing required
73.45	AM transmission system emission limitations
73.51	Determining operating power
73.53	Requirements for authorization of antenna monitors
73.54	Antenna resistance and reactance measurements
73.57	Remote reading antenna and common point ammeters
73.58	Indicating instruments
73.61	AM directional antenna field strength measurements
73.62	Directional antenna system tolerances
73.68	Sampling systems for antenna monitors
73.69	Antenna monitors
73.151	Field strength measurements to establish performance of directional antennas
73.152	Modification of directional antenna data
73.153	Field strength measurements in support of applications or evidence at hearings
73.154	AM directional partial proof of performance measurements
73.158	Directional antenna monitoring points
73.189	Minimum antenna heights or field strength requirements

5. The purpose of these rules is to set out the Commission's regulatory framework for assuring that AM directional arrays will be properly designed, constructed, tested, monitored and maintained. This is necessary because a misadjusted array could cause interference to cochannel and adjacent channel stations both locally, via groundwave signals, and at great distances, via skywave signals. Misadjustment of an array can arise from many causes, including faulty measurement equipment and faulty measurement procedures. It is often difficult to reconcile theoretical calculations of array performance with actual field measurements of an array's performance. Several sophisticated antenna array modeling programs are now available for use on computers which can predict patterns for very complex combinations of power and phase. It is difficult with these programs, however, to take into account the collateral effects of obstructions, such as buildings and nonresonant wires (e.g. power and telephone lines), which are proximate to the array being analyzed. As petitioners note, the formidable task of verifying actual array performance has put a significant financial burden on AM licensees.

6. In Docket 87-267, the Commission adopted a sweeping restructuring of the AM broadcast service in order to reduce the current level of interference in the band, and to make available new AM broadcast frequencies directly above the current band edge.³ As commenters in that proceeding noted, misadjustment of AM directional arrays was a major contributing cause of high interference levels in the current band, and proper adjustment of any directional arrays licensed in the new band would be very important in controlling interference in that band. For this reason, and because the Commission's regulations have not been comprehensively evaluated in light of much of the new technology affecting array design and measurement, we believe it would now be appropriate to initiate a *Notice of Inquiry* into this matter.⁴

THE INQUIRY

7. In the broadest sense, this inquiry seeks to identify those portions of the current rules affecting AM directional arrays which ought to be the subject of a *Notice of Proposed Rulemaking*. We ask interested parties to review each of the rules listed in paragraph 4, *supra*, and any others which they find relevant, and evaluate which of these, in whole or part, ought to be amended or deleted. Criteria which may be of use in such evaluations include, but are not limited to, the following:

(a) What types of instrumentation are appropriate at the AM broadcast station for measuring antenna operating parameters? Where, physically and electrically, should this instrumentation be placed? Within what bounds of variation should parameters be maintained? What instrumentation error tolerance is acceptable? How frequently should the instrumentation readings be examined? How frequently should the instrumentation itself be calibrated, and to what standard? What type and extent of documentation of instrument readings should be generated and maintained? What information should be submitted to the Commission, and in what time frame(s)?

(b) What routine should be followed in taking measurements in the field? What parameters should be measured? What instrumentation is appropriate? At what distances should readings be taken? What should be the criteria for selecting sites for field measurements? To what degree should there be repeatability for readings from the same site?

(c) To what extent should theoretical, rather than measured, parameters be acceptable? Which theoretical computational routines are acceptable for use in lieu of measurements, and which are not? How is the difference between calculated and measured parameters to be resolved when the results differ? What magnitude of difference is acceptable, and what is too large?

³ See *Notice of Proposed Rule Making*, MM Docket No. 87-267, 5 FCC Rcd 4381 (1990) and *Report and Order*, MM Docket No. 87-267, 6 FCC Rcd 6273 (1991).

⁴ We can understand Hatfield & Dawson's desire to proceed as rapidly as possible on this matter, but we agree with Lahm,

Suffa & Cavell, Inc. that the number of issues involved, and their impact on the service, is of such a magnitude that a full record should be established first in an *Inquiry*, rather than proceeding immediately to a *Notice of Proposed Rulemaking*.

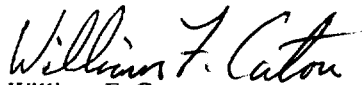
(d) To what degree is it practical or necessary to take into account other structures in the vicinity of the array? Which structures should be considered and which ignored? Can this ever be done theoretically, or must this effect always be measured in the field? Should the effect be remeasured/recalculated when new structures are added, or existing structures significantly modified or removed?

8. Our goal is to formulate a set of proposed rules which will ensure that array evaluations are done thoroughly and accurately, and to the degree necessary to meet the interference criteria put in place as a result of Docket 87-267. We wish to eliminate any redundant, outmoded or unnecessary rules, as well as any rules which impose a significant burden on licensees, without sacrificing the benefits of interference control. We will focus our efforts here, as we did in Docket 87-267 and related rulemakings, on formulating rules which promote the long term viability and quality of the AM Service.

PROCEDURAL MATTERS

9. This Notice of Inquiry is issued pursuant to authority contained in Sections 4(i), 303 and 403 of the Communications Act of 1934, as amended. Pursuant to applicable procedures set forth in Sections 1.415 and 1.419 of the Commission's Rules, 47 CFR 1.415 and 1.419, interested parties may file comments on or before **August 20, 1993**, and reply comments on or before **September 7, 1993**. All relevant and timely filed comments will be considered by the Commission before taking further action in this proceeding. To file formally in this proceeding, participants must file an original and four copies of all comments, reply comments and supporting documents. If participants want each Commissioner to receive a personal copy of their comments, an original and nine copies must be filed. Comments and reply comments should be sent to the Offices of the Secretary, Federal Communications Commission, Washington, D.C., 20554. Comments and reply comments will be available for public inspection during regular business hours in the Dockets Reference Room (Room 239) of the Federal Communications Commission, 1919 M Street N.W., Washington D.C., 20554. For further information, contact Joseph M. Johnson, Engineering Policy Branch, Policy and Rules Division, Mass Media Bureau, (202) 632-9660.

FEDERAL COMMUNICATIONS COMMISSION



William F. Caton
Acting Secretary